

Association of Atopic Dermatitis With Ophthalmologic Diseases in Hospitalized US Adults

M. Shaheen, JD¹; J. Silverberg, MD, PhD, MPH²

¹Stanford University School of Medicine, Stanford, CA, USA; ²Department of Dermatology, George Washington University School of Medicine and Health Sciences, Washington, DC.

Introduction: Atopic dermatitis (AD) has well-established associations with multiple ophthalmic comorbidities, including conjunctivitis and cataracts. However, associations of AD with the full spectrum of ophthalmic comorbidities have not been fully elucidated. In addition, AD patients have multiple risk factors for ophthalmic emergencies (OEs) that may lead to hospitalization. Still, little is known about OEs in AD. We sought to determine whether AD is associated with higher odds of conjunctivitis, keratitis, keratoconus, cataract, glaucoma, and pterygium overall and, particularly, hospitalization for these disorders.

Methods: Data from the 2002-2012 Nationwide Inpatient Sample (NIS) were analyzed (n=72,512,581 hospitalizations in adults, age >18 years). NIS contains an approximately 20% stratified sample of all hospitalizations in the United States. Sample weights factored the complex sample design and stratification, allowing for representative estimates of hospital discharges across the entire country. The unit of analysis was an inpatient stay. AD and OEs were identified using *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes from all listed discharge diagnoses. Odds of OEs, inflation-adjusted cost of inpatient care, and mean length of stay were all examined. Statistical analysis was performed using survey procedures in SAS version 9.4 (SAS Institute, Cary, NC).

Results: There were 86,066 hospitalizations with conjunctivitis, 15,738 with keratitis, 749 with keratoconus, 128,683 with cataract, 812,629 with glaucoma, and 1630 with pterygium. In multivariable logistic regression models adjusting for age, sex, insurance, household income, and race, hospitalization for AD was associated with increased odds of hospitalization for all OEs examined. The adjusted odds ratio (95% CI) for a primary or secondary hospitalization for conjunctivitis was 4.46 (4.13-4.83); for keratitis, it was 3.98 (3.28-4.83); keratoconus, 11.52 (5.70-23.30); cataract, 2.52 (2.31-2.74); glaucoma, 1.53 (1.46-1.60); and pterygium, 3.93 (2.22-6.94). These associations remained significant in stratified analyses separately in males and females. The adjusted odds ratio (95% CI) for a primary hospitalization were significantly increased for conjunctivitis, 9.04 (4.78-17.12), and keratitis, 2.47 (1.35-4.51), but not for cataracts, 0.36 (0.05-2.93), or glaucoma, 0.32 (0.05-2.31). Significantly higher mean [95% CI] inflation-adjusted costs of inpatient care were observed in adult inpatients with AD who were admitted with vs without a primary or secondary diagnosis of cataracts (\$40,458 [\$35,884-\$45,033] vs \$29,142 [\$28,181-\$30,102]) or glaucoma (\$33,367 [\$31,334-\$35,400] vs \$29,126 [\$28,166-\$30,086]) ($P<.05$). Adult AD inpatients had a significantly prolonged mean length of stay (mean days [95% CI]) when they were admitted with vs without a primary or secondary diagnosis of conjunctivitis (7.09 [6.47-7.71] vs 5.90 [5.78-6.02]), keratitis (9.01 [6.88-11.14] vs 5.91 [5.78-6.03]), cataract (6.99 [6.14-7.84] vs 5.90 [5.78-6.03]), or glaucoma (6.25 [5.93-6.56] vs 5.90 [5.78-6.03]) (all $P<.05$).

Conclusions: AD was associated with increased odds of conjunctivitis, keratitis, keratoconus, cataract, glaucoma, and pterygium, and of OEs for conjunctivitis and keratitis in US adults. Specific OEs were associated with higher inpatient costs of care and/or prolonged length of stay. Future interventions are warranted to better manage ophthalmic comorbidities of AD in the outpatient setting and prevent OEs requiring hospitalization in AD patients.